



GLAMR is a tunable and high-powered laser system that provides an ideal light source for characterizing the spectral and radiometric response of an instrument. This pure signal is allows decoupling of sensor features (e.g. linearity, crosstalk, scattered light) and orders of magnitude better absolute radiometric accuracies.



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Technical Description of Figures:

Graphic a: A photo of the integrating sphere that is coupled to the laser output of GLAMR via fiber optic, in this case GLAMR is tuned to 400 nm. The randomizing effect of the integrating sphere converts the gaussian beam output from the fiber to a near-ideal source of radiance. In preparation for VIIRS characterization, the radiometers that are staring into the sphere in this photo are transferring SI-traceable radiometric knowledge to the monitors on the sphere.

Graphic b: GLAMR consists of several laser systems to achieve spectral tunability over the full solar reflective spectrum. This photo shows a portable optical table that hosts two LBO-based optical parametric oscillators that provide most of this spectrum.

Graphic c: This is a photo showing the experimental set up of the laser-based characterization of JPSS-1 VIIRS.

Graphic d: This plot provides an example of one of the sensor parameters that can be characterized with a laser-based calibration system, in this case cross talk.

Scientific significance, societal relevance, and relationships to future missions:

The Goddard Laser for Absolute Measurement of Radiance (GLAMR) provides an ideal light source for characterization of remote sensing instruments operating in the solar reflective spectrum: a monochromatic, extended source with SI traceability and accuracy more than ten times better than traditional calibration sources. Such a source allows better understanding of sensor features like nonlinearities, crosstalk, and scattered light which can be used to parameterize more sophisticated instrument models, the pathway for achieving accuracies to more quickly detect climate change and better decouple earth processes.

GLAMR will be used for to characterize the spectral and radiometric response of JPSS-2 VIIRS in summer 2016 in its first demonstration with a satellite instrument. Previous VIIRS sensors currently onboard Suomi NPP and JPSS-1 have been characterized by a similar laser system by NIST. Since this time NIST and NASA have been collaborating to transfer the methodology and technology for more operational use at GSFC. Currently, projects including JPSS-3/4 VIIRS, Landsat 9 OLI-2, PACE-OCI, and CLARREO Pathfinder have GLAMR as required activity of their prelaunch calibration plans.